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GREAT LAKES FORESTRY CENTRE
CENTRE FORESTIER DES GRANDS LACS

Results of forest insect and disease surveys in the NORTHERN REGION of Ontario, 1985

CARRIED OUT BY THE GREAT LAKES FORESTRY CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES

L S Macleod, C G Jones and A J Kelzer

Miscellaneous Report No. 38

Canada

THE GREAT LAKES FORESTRY CENTRE

The Great Lakes Forestry Centre is one of six regional establishments located across Canada and operated by the Canadian Forestry Service. The overall objective of the Service is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. The Centre pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

Forestry problems are continually assessed by the Canada-Ontario Joint Forestry Research Committee, made up chiefly of senior members of the Centre and the Ontario Ministry of Natural Resources. The Committee ensures that the research resources of both agencies are effectively transmitted to the forest managers in order to improve forest production and protection, and the quality of the environment.

Staff of the forestry development program negotiate and administer federal-provincial cost-sharing agreements with the province of Ontario, conduct economic studies, and implement job creation programs in the forest sector. Again, this requires close cooperation with the Ontario Ministry of Natural Resources and with other provincial and federal agencies concerned with the forest sector.

Close working relations are also maintained by the Centre with educational institutions specializing in forestry and the biological sciences, with the forest industry, and with other forestry organizations in the province.

The Centre recognizes that forested land must be managed in the best public interest, not only for the wood production essential to our economy but also for the recreational purposes that are so important to our social well-being. These goals must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE NORTHERN REGION OF ONTARIO, 1985

(FOREST DISTRICTS: MOOSONEE, HEARST, KAPUSKASING, COCHRANE, CHAPLEAU, TIMMINS, KIRKLAND LAKE and GOGAMA)

L.S. MACLEOD, C.G. JONES and A.J. KEIZER

GREAT LAKES FORESTRY CENTRE
CANADIAN FORESTRY SERVICE
GOVERNMENT OF CANADA
1986

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SURVEY HIGHLIGHTS

The cool, damp weather patterns experienced in 1985 apparently did not adversely affect insect populations in the Region.

Jack pine budworm infestations in the southern part of the Region increased dramatically. The overall area of moderate-to-severe defoliation totalled 955,755 ha in the Chapleau, Gogama and Kirkland Lake districts. Aerial spraying operations were carried out in high-value stands in all three districts.

High populations of the spruce budworm persisted in the Hearst District and egg-mass sampling indicated a continuation of this infestation in 1986. Selected stands were again treated by aerial spraying in this district. There was a minor resurgence of budworm populations in the Chapleau District where approximately 5,435 ha of moderate-to-severe defoliation was mapped south of Windermere Lake. In all other districts the spruce budworm continued to decline in numbers.

Infestations of the forest tent caterpillar expanded substantially in the Kirkland Lake District and smaller areas of defoliation were mapped in Gogama, Cochrane and Chapleau districts. Yellowheaded spruce sawfly continued to damage windbreaks, plantations and snowhedges at many locations in the Region.

Special projects carried out in 1985 included an experimental pheromone trapping program for the black army cutworm; routine annual pheromone trapping to monitor spruce budworm populations; pheromone trapping in all provincial parks to determine the presence or absence of gypsy moth; detailed surveys for insects and diseases affecting jack pine plantations; surveys for evidence of the pinewood nematode and monitoring of selected stands for the effects of acid precipitation.

The same format was followed in categorizing pests as in the 1984 Northern Region report:

Major Insects and Diseases

capable of causing serious injury to or death of living trees or shrubs

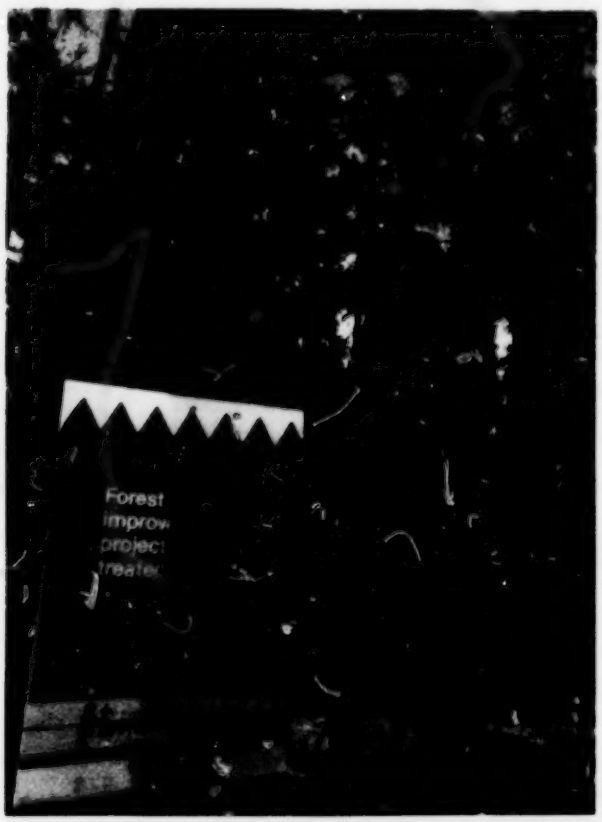
*Minor Insects or Diseases**

capable of sporadic or localized injury but not usually a serious threat to living trees or shrubs

*No minor insects or diseases were reported in the Northern Region in 1985.

Frontispiece

Jack pine (*Pinus banksiana* Lamb.) severely defoliated by the jack pine budworm, *Choristoneura pinus pinus* Free.



An extensive spray program was carried out in the Chapleau, Gogama and Kirkland Lake districts in an effort to minimize damage by the jack pine budworm.

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

1) those which are of minor importance and have not been known to cause serious damage to forest trees,

2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1985.

L.S. MacLeod

C.G. Jones

A.J. Keizer

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INSECTS

Major Insects

Black Army Cutworm, *Actebia fennica* (Tausch.)

The black army cutworm has recently been recognized as a potentially destructive pest of conifer seedlings planted on sites that have been prepared for planting by prescribed burning (see photo page). The first major infestation in the Region occurred in 1984 in Township 239, Hearst District, and caused heavy losses of black spruce *(Picea mariana* [Mill.] B.S.P.) seedlings but did not recur in 1985. However, high numbers were found in Hill Township, Chapleau District and in Londonderry Township, Gogama District, on sites that were burned in 1983 and 1984. At both locations the larvae preferred to feed on the abundant herbaceous ground cover and damage to the jack pine *(Pinus banksiana* Lamb.) seedlings was limited. In Hill Township only 4.5% of the 2.0 planting stock was approximately 40% defoliated and damage in Londonderry Township was negligible.

Monitoring of adult cutworm populations in burned areas by pheromone trapping was initiated in 1985 (see photo page and Fig. 1). "Multi-Pher" and "Hara" traps were set out in 1983, 1984 and 1985 prescribed burns and adults were captured from 2 August to 27 September when trapping was terminated (Table 1). In Strom Township, Chapleau District, a moth was captured only eight days after the burn was completed.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

The birch skeletonizer infestation that began to decline in the northern districts of the Region in 1983 collapsed completely in 1985. Few larvae were found and no defoliation was observed in areas where damage occurred in 1984.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Results of damage surveys, population sampling and egg-mass counts of the spruce budworm will be published with those of other regions at a later date in a report specifically devoted to this insect. The report will provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1985 and will give infestation forecasts for the province for 1986.

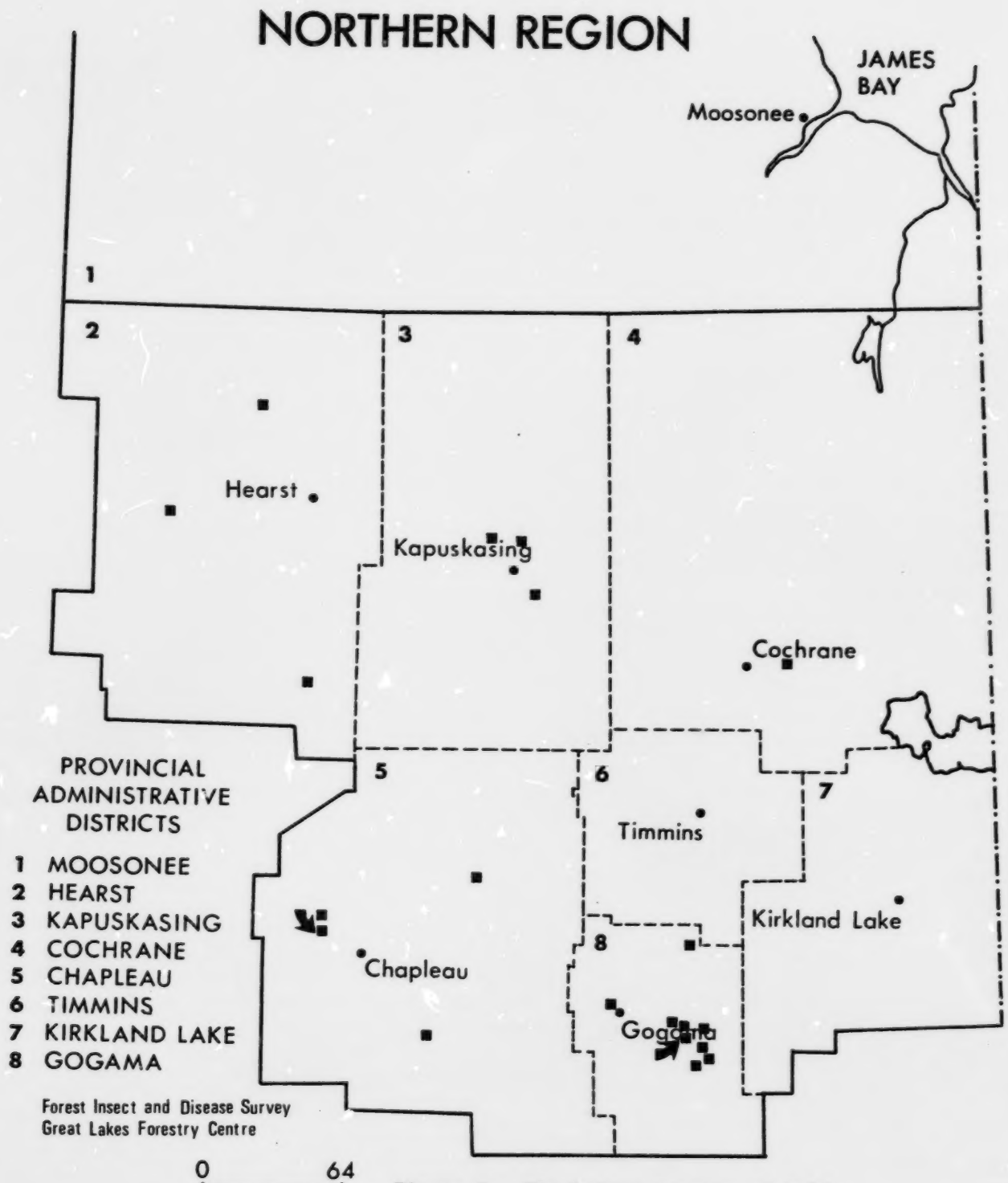


Figure 1. Black Army Cutworm, *Actebia fennica* (Tausch.)
Locations of infestations and pheromone traps in 1985
Trap locations . . . . . ■
Infestations . . . . . ■

Table 1. Summary of the results of pheromone trapping for black army cutworm in four districts in 1985.

Location (Twp)	Date of prescribed burn	Date traps set	Moth captures "Hara"	Moth captures "Multi-Pher"
Chapleau District				
Warren	15-5-85	3-7-85	3	3
Strom	26-7-85	31-7-85	1	3
Hill	15-7-84	2-7-85	4	3
Gogama District				
Miramichi	13-6-83	3-7-85	0	1
Londonderry	31-8-83	5-7-85	1	4
Londonderry	16-9-85	17-9-85	3	a
Moher	22-7-83	5-7-85	-	1
Jack	29-4-84	5-7-95	-	1
Garibaldi	30-7-84	5-7-85	-	1
Garibaldi	15-8-84	5-7-85	-	7
Hearst District				
Twp 240	16-8-84	15-7-85	12	10
Minnipuka	1-9-84	19-7-85	84	3
McEwing	3-8-85	12-8-85	6	20
Kapuskasing District				
Williamson	3-9-84	19-7-85	1	1
Teetzel	30-8-84	19-7-85	8	89
Teetzel	28-8-85	13-9-85	32	100
Nansen	27-8-85	14-9-85	0	0

[a]Traps not deployed.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

The area infested by the jack pine budworm in the southern districts of the Region increased substantially in 1985 (Fig. 2). The gross area of moderate-to-severe defoliation increased from 171,595 ha in 1984 to 955,755 ha in 1985. The main body of the infestation was located in the southern part of the Region and consisted of 546,198 ha in the Chapleau District, 334,815 ha in the Gogama District and 74,742 ha in the southern part of the Kirkland Lake District.

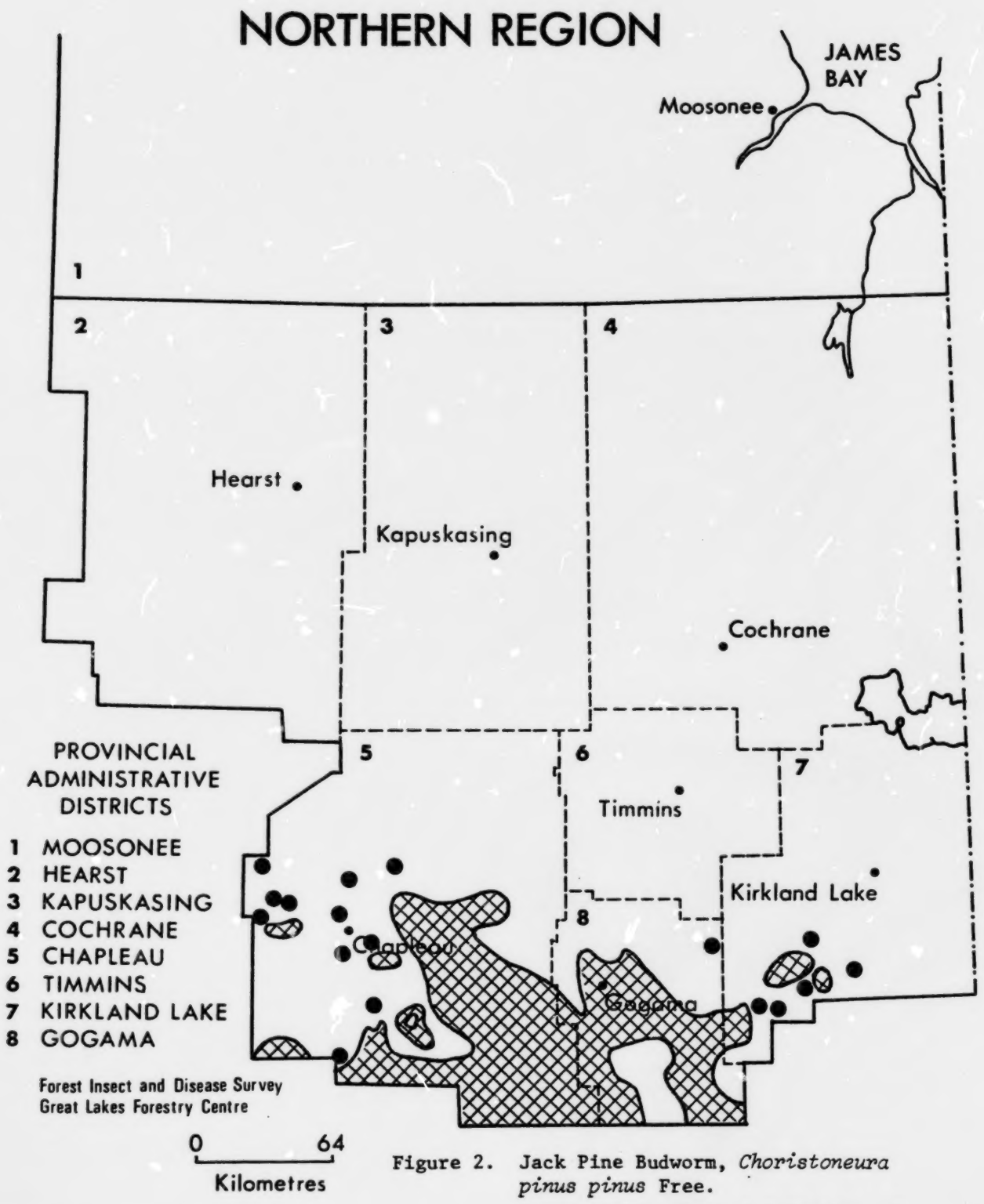


Figure 2. Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Areas within which defoliation of jack pine (*Pinus banksiana* Lamb.) occurred in 1985

Moderate-to-severe or ●

In an effort to prevent foliage loss and resultant tree mortality in high-value stands, the Ontario Ministry of Natural Resources (OMNR) aerially sprayed a total of 84,170 ha in the Region (see Frontispiece). The pesticide *Bacillus thuringiensis (B.t.)* was used exclusively and generally provided excellent foliage protection in the treated stands.

Two formulations of this pesticide were utilized in the spray program, namely, Dipel and Thuricide. The following is a breakdown of areas sprayed in the Northern Region, by district and formulation type.

District	Thuricide (ha)	Dipel (ha)	Experimental *B.t.* (ha)
Chapleau	24,169	7,951	-
Gogama	24,290	1,414	841
Kirkland Lake	25,505	0	-
Total	73,964	9,365	841

Top and whole-tree mortality can occur after only two consecutive years of moderate-to-severe defoliation. Surveys in the Northern Region showed no tree mortality, although some areas have experienced extensive leader and/or tip mortality.

Egg-mass sampling to forecast 1986 populations was carried out at 114 locations through the Region. The results of this survey indicate a sharp reduction in the intensity of the infestation in 1986 (Table 2).

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Generally, the number of leaders killed by this shoot borer was lower in jack pine plantations than in 1984. Moderate damage was recorded in one plantation in Skead Township, Kirkland Lake District, where leader mortality averaged 9.3% (Table 3). Of 15 stands evaluated across the Region six were negative in 1985.

Table 2. Northern Region - jack pine budworm: Summary of defoliation estimates and egg-mass counts in 1985 and infestation forecasts for 1986 on jack pine.

Location	Estimated % defoliation 1985	Total no. of egg masses on six 1-cm branch tips	Infestation forecast for 1986[a]
Chapleau District (46 locations)			
Alcona Twp	26	1	L
Arbutus Twp	30	2	L
Birch Twp	65	14	H
Blackburn Twp	13	0	N
Blamey Twp	5	2	L
Breadner Twp	78	3	M
Cavana Twp	34	0	N
Chappise Twp	5	1	L
Chewett Twp	0	0	N
Collishaw Twp	2	0	N
Cortez Twp[b]	33	5	M
Denyes Twp	10	0	N
Dore Twp	4	0	N
Earl Twp[b]	18	4	M
Eisenhower Twp[b]	19	1	L
Fawn Twp	38	0	N
Foleyet Twp	2	0	N
Fulton Twp	31	9	H
Gilliland Twp	14	3	M
Gladwin Twp	39	5	M
Guindon Twp	12	14	H
Iris Twp	60	8	H
Ivy Twp	27	3	M
Kaplan Twp	48	0	N
Lackner Twp	5	2	L
Lemoine Twp	0	0	N
Margaret Twp	15	2	L
McNaught Twp	4	1	L
McPhail Twp	42	8	H
Moen Twp	2	0	N
Moggy Twp	37	6	H
Neelands Twp[b]	5	6	H
Nimitz Twp - Hwy 667	16	1	L
Nimitz Twp - research plot	45	7	H

(cont'd)

Table 2. Northern Region - jack pine budworm: Summary of defoliation estimates and egg-mass counts in 1985 and infestation forecasts for 1986 on jack pine (cont'd).

Location	Estimated % defoliation 1985	Total no. of egg masses on six 61-cm branch tips	Infestation forecast for 1986[a]
Chapleau District (cont'd) (46 locations)			
Nimitz Twp - research plot	29	4	M
Panet Twp	4	0	N
Panet Twp - research plot	12	0	N
Peters Twp	3	1	L
Peters Twp	4	0	N
Racine Twp	1	0	N
Sandy Twp	2	0	N
Shipley Twp[b]	5	2	L
Silk Twp	1	1	L
Specht Twp[b]	26	0	N
Topham Twp	58	7	H
Wakami Twp[b]	5	3	M
Cochrane District (5 locations)			
Avon Twp	0	0	N
Calvert Twp	0	0	N
Dempsay Twp	0	1	L
Dundonald Twp	0	1	L
Sheldon Twp	2	0	N
Gogama District (24 locations)			
Benneweis Twp[b]	2	5	M
Carter Twp	60	0	N
Cotton Twp	10	1	L
Dublin Twp	67	13	H
Garvey Twp	79	10	H
Invergarry Twp	65	5	M
Kelvin Twp	1	0	N

(cont'd)

Table 2. Northern Region - jack pine budworm: Summary of defoliation estimates and egg-mass counts in 1985 and infestation forecasts for 1986 on jack pine (cont'd).

Location	Estimated % defoliation 1985	Total no. of egg masses on six 61-cm branch tips	Infestation forecast for 1986[a]
Gogama District (cont'd) (24 locations)			
Lampman Twp	61	22	H
MacMurchy Twp	4	0	N
Mattagami Twp[b]	77	5	M
Mattagami Twp - check plot	71	4	M
McNamara Twp - Stand 129	69	12	H
Miramichi Twp	58	2	L
Noble Twp - Block 4[b]	8	3	M
Noble Twp - Block 6[b]	8	2	L
Noble Twp - Block 8[b]	38	13	H
Northrup Twp	1	0	N
Ogilvie Twp	99	8	H
Paudash Twp - Stand 436	9	1	L
Roblin Twp	0	0	N
Scotia Twp	87	19	H
Vrooman Twp - Plot 9[b]	27	7	H
Vrooman Twp - Plot 11[b]	30	8	H
Westbrook Twp[b]	12	10	H
Hearst District (9 locations)			
Arnott Twp	0	1	L
Beaton Twp	2	0	N
Cross Twp	0	0	N
Elgie Twp - Hwy 631	0	0	N
Elgie Twp - W. of Elgie Rd	1	0	N
Ermine Twp	0	0	N
Frost Twp	0	0	N
Larkin Twp	2	0	N
Wicksteed Twp	2	0	N

(cont'd)

Table 2. Northern Region - jack pine budworm: Summary of defoliation estimates and egg-mass counts in 1985 and infestation forecasts for 1986 on jack pine (cont'd).

Location	Estimated % defoliation 1985	Total no. of egg masses on six 61-cm branch tips	Infestation forecast for 1986
Kapuskasing District (5 locations)			
Fauquier Twp	1	0	N
Harmon Twp	5	0	N
Howells Twp	5	0	N
Lisgar Twp	0	0	N
Radisson Twp	0	1	L
Kirkland Lake District (18 locations)			
Bannockburn Twp	0	1	L
Beauchamp Twp	44	0	N
Bryce Twp	27	0	N
Charters Twp	21	1	L
Chown Twp	32	0	N
Corkill Twp	43	1	L
Dunmore Twp	0	0	N
Greenfell Twp	0	0	N
James Twp	16	0	N
Kimberley Twp	8	1	L
Lawson Twp	28	1	L
Mickle Twp	28	0	N
Mickle Twp - Silver Claim Lake	51	0	N
Ray Twp	45	1	L
Ray Twp[b]	8	1	L
Tyrrell Twp	7	0	N
Willet Twp	50	1	L
Willison Twp	28	0	N
Timmins District (7 locations)			
Crothers Twp	0	0	N
Evelyn Twp	0	0	N

(cont'd)

Table 2. Northern Region - jack pine budworm: Summary of defoliation estimates and egg-mass counts in 1985 and infestation forecasts for 1986 on jack pine (concl.)

Location	Estimated % defoliation 1985	Total no. of egg masses on six 61-cm branch tips	Infestation forecast for 1986[a]
Timmins District (cont'd) (7 locations)			
German Twp	0	0	N
McKeown Twp	0	0	N
Murphy Twp	0	2	L
Robb Twp	0	0	N
Timmins Twp	0	0	N

[a]N = nil, L = light, M = moderate, H = heavy
[b]Aerially sprayed, *B.t.*, 1985

Birch Leafminer, *Fenusa pusilla* (Lep.)

Discoloration and defoliation caused by this introduced leafminer continued to increase in white birch (*Betula papyrifera* Marsh.) stands in most districts of the Region. Severe mining was sporadic in the Kapuskasing District, where light infestations were general in the townships of Williamson, Fauquier, Pearse, Casselman and Alexandra. High numbers were noted on ornamentals in the town of Kapuskasing. Heavy mining was reported from the towns of Hearst, Cochrane and Iroquois Falls as well as at several locations in Calvert and Fournier townships, Cochrane District. Severe mining was general in urban areas in the Chapleau and Gogama districts. Foliar damage was severe through the Timmins and Kirkland Lake districts where groups of mature trees showing conspicuous discoloration were readily detected during aerial surveys. Small groups of trees, ranging from one to 50 in number, were heavily attacked in the Charlton-South Y-Long Lake area of the Kirkland Lake District and sustained up to 80% defoliation. Heavy damage to the foliage of ornamental birches was also recorded in the towns of Swastika, Kirkland Lake, Larder Lake, Timmins and South Porcupine.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Infestations of this defoliator increased considerably in three districts of the Region (see photo page). The Painkiller Lake infestation in the northern part of the Kirkland Lake District expanded from 6,400 ha in 1984 to 11,600 ha in 1985. This included an area of some

Table 3. Summary of leader damage caused by the eastern pine shoot borer in five districts of the Northern Region in 1985 (counts based on the examination of 150 randomly selected trees at each location).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Leaders killed (%)
Chapleau District				
Edith	2.5	1,000	34	4.0
Oates	2.3	900	25	2.0
Gogama District				
Browning	1.9	1,330	60	0.6
Cochrane District				
N. of Lake Abitibi	3.0	2,000	25	0.7
Timmins District				
Robb	2.0	2,000	100	2.4
Adams	2.3	2,000	50	4.0
Kirkland Lake District				
Skead	2.2	2,900	75	9.3
Doon	0.5	2,900	100	2.0
Corkill	2.3	2,900	322	1.7

1,250 ha in adjacent Wilkie Township, Cochrane District. A much larger infestation of caterpillars severely defoliated trembling aspen (*Populus tremuloides* Michx.) stands over an area of 157,178 ha north and west of Lake Timiskaming in the Kirkland Lake and Temagami districts (Fig. 3). The affected area extended from Fourbass Lake in South Lorrain Township, Temagami District, to Mallard Lake in Ingram Township, Kirkland Lake District, with all or part of 10 townships in the southeast section of the Kirkland Lake District and 11 townships in the northeast section of the Temagami District being infested. Severe defoliation also extended many kilometres into Quebec east of Lake Timiskaming. A third infestation in the Kirkland Lake District affected aspen stands within an area of approximately 16,368 ha west of Gowganda in Raymond, Knight, Tyrrell, Van Hise, Milner, Haultain and Nicol townships. In adjacent areas in Natal, Macmurchy, Fawcett and Asquith townships, Gogama District, three

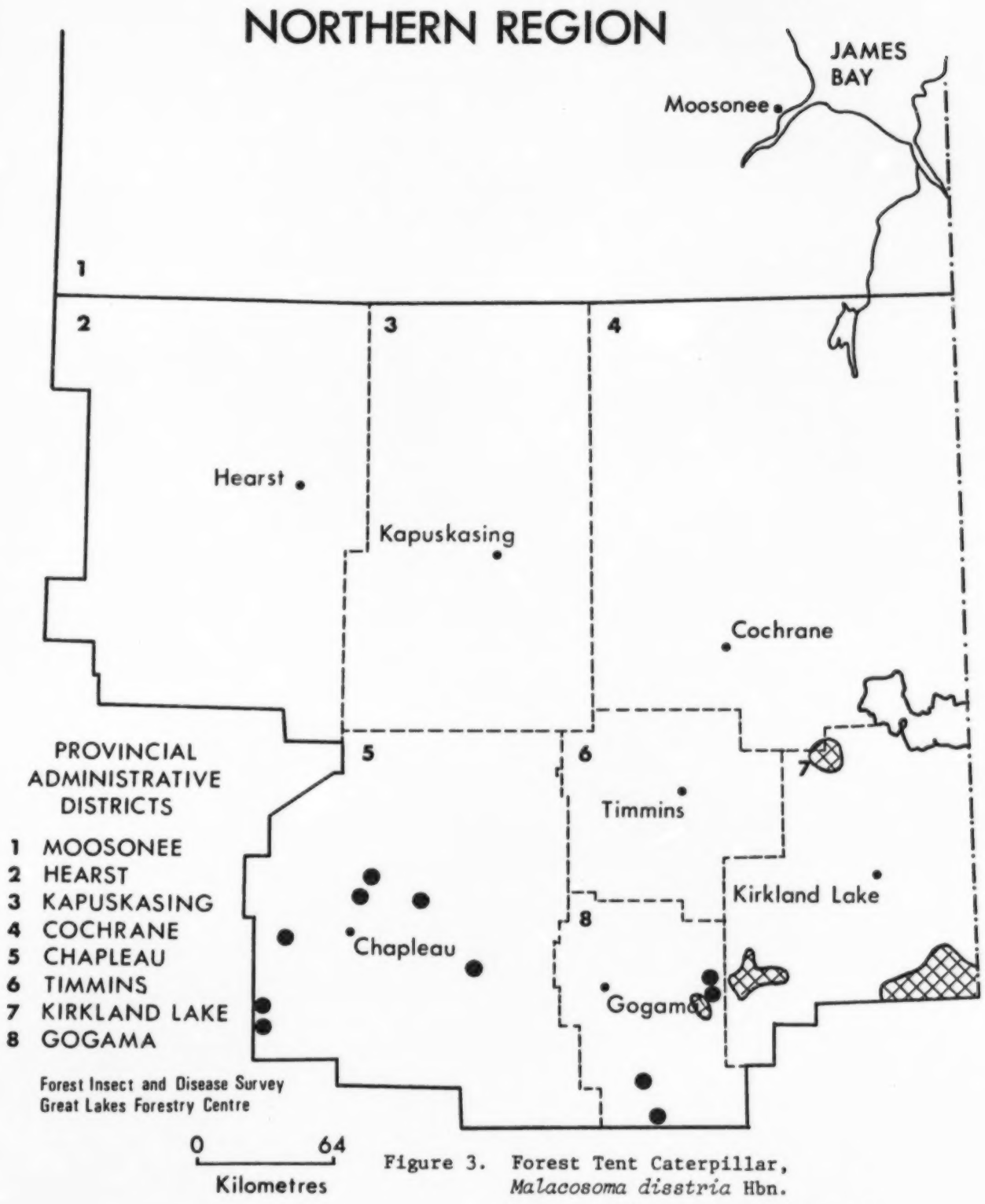


Figure 3. Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Areas within which moderate-to-severe defoliation occurred in 1985

pockets of moderate-to-severe defoliation encompassed some 4,440 ha of trembling aspen stands. Infestations in the Chapleau District included a pocket of about 50 ha in Triquet and Hoey townships and small areas ranging from 1 to 5 ha in Engstrom, Panet, Borden and Blamey townships.

Egg-band counts taken in the fall at 14 locations in the four infestations indicate that severe defoliation will recur in most areas in 1986 (Table 4).

Table 4. Summary of forest tent caterpillar egg-band counts on trembling aspen in two districts in the Northern Region in 1985 and infestation forecasts for 1986.

Location (Twp)	Avg DBH of trees (cm)	No. of trees sampled	Total no. of egg bands	Infestation forecasts for 1986
Gogama District				
Churchill	15.0	3	11	moderate
Macmurchy	28.3	1	34	heavy
Kirkland Lake District				
Tyrrell	10.0	1	22	heavy
Milner	20.0	1	264	"
Casey	10.0	1	27	"
Armstrong	5.0	1	6	"
Hilliard	5.0	1	46	"
Harley	5.0	1	51	"
Hudson	5.0	1	57	"
Henwood	5.0	1	28	"
Hislop	7.0	1	12	"
Coulson	7.0	1	27	"
Beatty	7.0	1	28	"
Carr	7.0	1	24	"

Jack Pine Sawflies, *Neodiprion virginianus* complex, *N. nanulus nanulus* Schedl., *N. maurus* Roh., *N. compar* (Leach), *N. pratti banksianae* Roh., and *N. swainei* Midd.

Several species of the genus *Neodiprion* were found infesting jack pine plantations and natural stands through the Region. In Hearst District scattered colonies of *N. virginianus* complex were found in McEwing and Wicksteed townships. *N. nanulus nanulus* Schedl. was also recorded in McEwing Township, and *N. maurus* Roh. in Fushimi Township. Populations were low at all points and little defoliation resulted. In Cochrane District *N. virginianus* and *N. compar* (Leach) were found in Avon and Marathon townships but associated damage was light.

Heavy infestations of *N. pratti banksianae* Roh. were found on fringe jack pine trees in Jack, Noble and Dublin townships, Gogama District. The same species caused 60% defoliation of ornamental trees at the Chapleau Air Base, Chapleau District. Fifty jack pine trees growing along Highway 101 in Caouette Township were 90% defoliated by *N. virginianus* complex and jack pines averaging 3 m in height in Shoals Provincial Park and in Gilliland Township sustained 25% and 80% defoliation, respectively.

The *N. swainei* Midd. infestation in the Elk Lake Management Unit, Kirkland Lake District, remained unchanged in 1985. No defoliation was visible from the air and only scattered colonies were found at check points. Little damage by any *Neodiprion* species was observed at other locations in the Kirkland Lake and Timmins districts.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.)

A definite increase in populations of this leafminer was noted in Hearst District, especially on trees under 4 m in height. Severe mining was observed in Pelletier, Irving, Studholme, Gourlay, Shannon, Frost, Wicksteed and Elgie townships where sampling showed counts as high as nine mines per leaf in Frost Township. In Kapuskasing District heavy infestations with up to 12 mines per leaf were noted in Cumming and Radisson townships and light mining was general in Fauquier, Owens, Williamson, Cargill, Gurney, Bourinot, Torrance and Hopkins townships. In Chapleau District foliar damage of 100% was recorded in two small areas, in Ivanhoe Provincial Park and in Blamey Township. In Gogama, Cochrane, Timmins and Kirkland Lake districts populations were generally low and foliar damage was negligible.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

Varying degrees of damage caused by this sawfly were evident in white spruce *(Picea glauca* [Moench] Voss) and black spruce plantations, on snowhedges and on ornamental trees in most districts of the Region.

Moderate-to-severe defoliation was general in semiurban areas along Highway 11 in Cochrane, Hearst and Kapuskasing districts. High populations recurred in Calder Township, Cochrane District, where in one white spruce plantation 81% of the trees were affected, and defoliation was 25% over all. Defoliation averaged 10% in a 37-ha white spruce plantation in Shannon Township, Hearst District, where 47% of the trees were attacked. High numbers were observed on ornamental trees around Remi Lake, Fauquier Township; on fringe trees near the HEPC power line in Harmon Township and on roadside regeneration in Howells and Nansen townships, Kapuskasing District.

Similar damage to spruce in urban and forest situations was common through Timmins and Kirkland Lake districts. Snowhedges and young trees were moderate to severely defoliated along Highway 11 in the Shillington-Matheson-Ramore area of the Kirkland Lake District. In James Township approximately 300 black spruce and white spruce trees along Highway 65 near Elk Lake sustained 50-75% defoliation. Windbreaks at the Swastika Forest Station were again treated by OMNR to prevent damage by the sawfly. In Stock Township, Timmins District, black spruce trees averaging 2.5 m in height were sporadically defoliated over approximately 300 ha of plantation.

Severe defoliation of small numbers of spruce trees was recorded at Ivanhoe and Wakami provincial parks, at Ramsay in Cavell Township, and in Carty Township, Chapleau District.

White Pine Weevil, *Pissodes strobi* (Peck)

In Hearst, Kapuskasing and Cochrane districts quantitative sampling showed little damage by the white pine weevil. Populations were higher in the southern districts of the Region and leader mortality was conspicuous in jack pine plantations, particularly in the Kirkland Lake District (Table 5).

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

An increase in distribution of this sawfly was recorded through the Region in 1985. Examination of tamarack *(Larix laricina* [Du Roi] K. Koch) stands revealed scattered colonies in Idington, Hopkins, Mowbray and Howells townships, Kapuskasing District; in Hanlan, Larkin and Wicksteed townships, Hearst District; in Denton and McKeown town-

ships, Timmins District; and in Grenfell and Eby townships, Kirkland Lake District. In all instances defoliation was minimal. In Chapleau District fringe trees 3 m high sustained 20% defoliation at one location in Hutcheon Township. No sawflies were found in the Gogama District in 1985.

Table 5. Summary of damage caused by the white pine weevil in seven districts in 1985 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Host	Avg ht of trees (m)	Estimated no. of trees per ha	Leaders attacked (%) 1985	Estimated area affected (ha)
Chapleau District					
Edith	jP	2.5	1,000	10.7	34
Oates	jP	2.3	900	2.7	25
Gogama District					
Vrooman	jP	0.6	2,500	7.3	60
Browning	jP	1.9	1,330	10.7	60
Kapuskasing District					
Opasatika	bS	1.3	2,200	0.7	50
Cochrane District					
Calder	wS	1.5	2,300	0.7	15
Hearst District					
Studholme	bS	3.3	2,100	0.7	25
Kirkland Lake District					
Skead	jP	2.0	2,900	12.7	75
Corkill[a]	jP	3.8	2,900	14.1	322
Cane	jP	2.4	2,500	12.0	150
Michie	jP	1.2	2,500	19.0	50
Dunmore	jP	2.2	2,000	14.0	50
Timmins District					
Adams	jP	2.5	2,000	11.0	15
Thornloe	jP	4.0	2,000	14.0	10

[a]300-tree sample

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)

The downward trend in populations of this sawfly noted in 1984 continued in 1985. Defoliation was relatively rare in forest situations and damage to ornamental trees was unusually light. Trace-to-light defoliation was observed along the Missinaibi Park Road, Chapleau District; along the Benneweis Township Road, Gogama District; and along Highway 631 south of Hornepayne, Hearst District.

Table 6. Other forest insects.

Insect	Host(s)	Remarks
Acantholyda erythrocephala Pine false webworm	jP	Surveys in Arnott Twp, Hearst District, revealed trace numbers in a plantation. This represents a new Forest Insect and Disease Survey distribution record.
Aceria sp. nr. *dispar* (Nalepa) Aspen leaf mite	tA	commonly found in most stands through both Kirkland Lake and Timmins districts
Acleris logiana (Cl.) Blackheaded birch leaffolder	wB	low numbers observed in Dundonald Twp, Cochrane District
Acleris variana (Fern.) Eastern blackheaded budworm	wS	low population levels found in several locations throughout the Region
Acrobasis betulella Hlst. Birch tubemaker	wB	trace population levels evident in most stands checked throughout the Region
Adelges abietis (L.) Eastern spruce gall adelgid	wS	A light infestation affected 0.5 ha of a plantation in Colquohoun Twp, Cochrane District.
Adelges lariciatus (Patch) Spruce gall adelgid	wS	Increasing populations were observed through Hearst, Cochrane and Kapuskasing districts; evaluations revealed that 55% of a 108 ha plantation was lightly affected in Larkin Twp, Hearst District.
Agrotis ipsilon (Hufn.) Black cutworm	bS	A private grower estimates that 50,000 black spruce seedlings were lost to this pest at La Maison Verte, Hearst.

(cont'd)

Table 6. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Altica ambiens alni Harr. Alder flea beetle	Al	Severe defoliation occurred on occasional roadside and lakeshore alder (*Alnus* spp.) bushes throughout the Region.
Altica subplicata Lec. Willow flea beetle	W	This skeletonizer caused severe browning of roadside bushes through the Hearst and Kapuskasing districts.
Aphelia alleniana (Fern.) Pine-and-clover tier	jP	low numbers in Dundonald Twp, Cochrane District
Aphrophora cribrata (Wlk.) Pine spittlebug	jP	commonly found at low population levels in Mageau Twp, Chapleau District
Apion simile Kby. Birch catkin weevil	wB	moderate numbers found throughout the Chapleau and Gogama districts
Archips cerasivorana (Fitch) Uglynest caterpillar	cCh	many tents observed in the rural areas of Kirkland Lake District; common in Fauquier and Casselman twps, Kapuskasing District, and Moher Twp, Gogama District
Arge pectoralis (Leach) Birch sawfly	wB, Al	increasing numbers reported from the Timmins, Kirkland Lake, Chapleau and Gogama districts; commonly found at low population levels elsewhere through the Region
Argyrotaenia tabulana Free. Jackpine tube moth	jP	light populations found in regeneration north of Lake Abitibi, Cochrane District
Caloptilia syringella (Fab.) Lilac leafminer	Lilac	Heavy leafmining occurred throughout the town of Chapleau.
Cecidomyia resinicola (O.S.) (= *reeksi* Vock.) Jack pine resin midge	jP	conspicuous shoot mortality occurred in scattered areas throughout the Region; a 2-km stretch of roadside trees displayed 50-90% new-shoot mortality in Barclay Twp, Chapleau District.

(cont'd)

Table 6. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Choristoneura conflictana (Wlk.) Large aspen tortrix	tA	light defoliation reported from Dowsley Twp, Hearst District
Cinara banksiana P. & T. Jack pine aphid	jP	moderate numbers observed in Garibaldi Twp, Gogama District
Cinara pergandei (Wils.) Jack pine aphid	jP	high numbers reported from Arnott Twp, Hearst District
Clepsis persicana Fitch Whitetriangle moth	jP	occasional larvae collected in Cross Twp, Hearst District; many adults captured during sex pheromone trapping for *Actebia fennica* Tausch, Chapleau and Gogama districts
Coleophora laricella (Hbn.) Larch casebearer	tL	trace population levels reported from Carew Twp, Chapleau District; low population levels found in Miramichi Twp, Gogama District, Kennedy and Calder twps, Cochrane District
Colephora pruniella Clem. (= *inmotabilis* Braun) Cherry casebearer	decid-uous	low numbers in the town of Chapleau
Compsolechia niveopulvella Chamb. Paleheaded aspen leafroller	tA	commonly found at low population levels through the Chapleau District
Conophthorus banksianae McPherson Jack pine tip beetle	jP	detected throughout the Region in small numbers
Contarinia negundifolia Felt Boxelder leafgall midge	mM	high populations through the towns of Kapuskasing and Cochrane
Corythucha pergandei Heid. Alder lace bug	Al	A 10-ha area of lakeshore bushes displayed feeding discoloration in Specht Twp, Chapleau District
Dioryctria abietivorella (Grt.) Fir coneworm	bF	low numbers recorded in Garibaldi Twp, Gogama District

(cont'd)

Table 6. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Dioryctria reniculelloides Mut. & Mun. Spruce coneworm	wS	low incidence and light foliar damage reported throughout the Region; exceptionally higher numbers found in the Nimitz Twp Seed Production Area (SPA), Chapleau District
Eitelius gregarius (Marl.) Willow skeletonizing sawfly	W	In Shoals Prov. Pk, Chapleau District, a 10-ha area had 60% of the host affected.
Epinotia solandriana L. Birch-aspen leafroller	wB, tA	light defoliation reported through most stands inspected throughout the Region
Eriophyes negundi Hodgk. Manitoba maple gall mite	mM	high numbers reported from the towns of Kapuskasing and Iroquois Falls
Eriosoma americanum (Riley) Woolly elm aphid	E	medium-to-heavy infestation in the town of Kapuskasing
Eupareophora parca (Cress.) Spiny ash sawfly	As	upper crowns of trees moderately defoliated at several points in the Kirkland Lake, Chapleau and Gogama districts
Fenusa dohrnii (Tischb.) European alder leafminer	Al	approximately 5 km of roadside bushes severely mined in Chappise Twp, Chapleau District
Filatima betulae Clarke Birch leafroller	tA	common at low population levels in association with *Malacosoma disstria* Hbn. through the Shining Tree area, Gogama District
Gilpinia hercyniae (Htg.) European spruce sawfly	wS	occasional larvae in most stands throughout the Kirkland Lake District
Gonioctena americana (Schaef.) American aspen beetle	tA	moderate-to-severe defoliation at various points in Dalmas, Peters and Borden twps, Chapleau District, and Dowsley Twp, Hearst District; elsewhere through the Region light defoliation detected

(cont'd)

Table 6. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Hyphantria cunea (Dru.) Fall webworm	decid-uous	tents very common along roadsides in the Timmins and Kirkland Lake districts; occasional colonies found in the Chapleau and Gogama districts
Lecanium fletcheri Ckll. Fletcher scale	eC	moderate numbers affecting a 45-ha area in Warren Twp, Chapleau District
Macrophya tibiator Nort. A sawfly	Elder-berry	severe defoliation of hosts through a 10-ha area in Shoals Prov. Park, Chapleau District
Malacosoma californicum pluviale Dyar Northern tent caterpillar	decid-uous	colonies frequently found throughout the Timmins, Kirkland Lake, Chapleau and Gogama districts
Messa populifoliella (Town.) Poplar leafmining sawfly	bPo	light leafmining activity recorded in McCrea Twp, Kapuskasing District, and Nassau Twp, Hearst District
Micurapteryx salicifoliella Cham. Willow leafminer	W	severe leafmining found occasionally through both the Hearst and Kapuskasing districts
Mindarus abietinus Koch. Balsam twig aphid	jP, wS	In Shoals Prov. Park, Chapleau District, a 0.5-ha area was moderately affected; in Carty Twp, Chapleau District, 40% of a 80-ha stand was also moderately affected.
Nematus limbatus Cress. Willow sawfly	W	scattered colonies through the Kirkland Lake, Kapuskasing and Chapleau districts
Nematus populi Marl. Poplar sawfly	tA	an average of 10% defoliation of occasional trees through Shoals Prov. Park, Chapleau District
Neodiprion abietis complex Balsam fir sawfly	wS	light damage observed in Casselman Twp, Kapuskasing District

(cont'd)

Table 6. Other forest insects (cont'd).

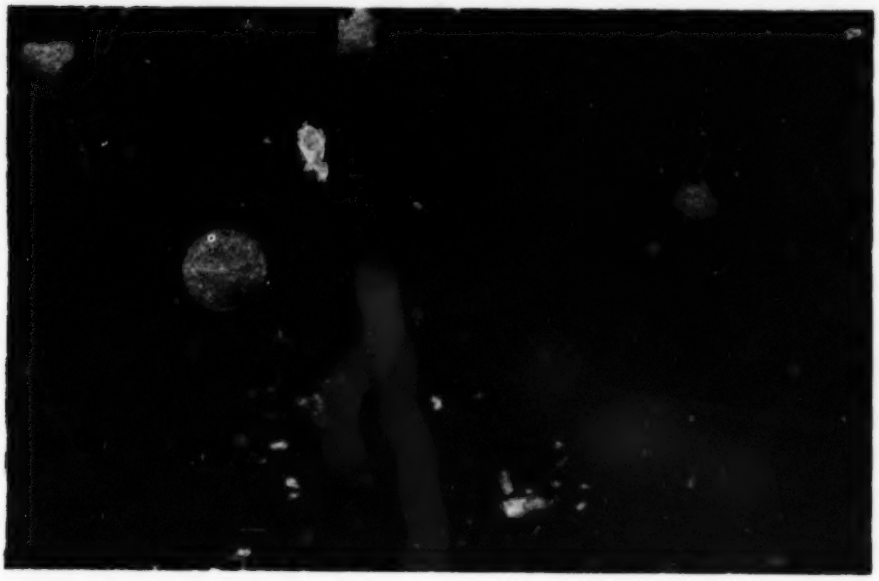
Insect	Host(s)	Remarks
Nycteola frigidana (Wlk.) Willow leaftier	W	commonly observed at low population levels through most of the Chapleau and Gogama districts; moderate upper-crown defoliation of 50% of available host in a 25-ha area in Shoals Prov. Park, Chapleau District
Nyphalis antiopa (L.) Mourningcloak butterfly, Spiny elm caterpillar	Deciduous	occasional whole trees and branches severely defoliated throughout the Region
Pachypappa tremulae (L.) Aspen aphid	tA	regeneration moderately affected over a 0.5-ha area in Dalmas Twp, Chapleau District
Petrova albicapitana (Busck) Northern pitch twig moth	jP	increased numbers observed throughout the Region; 2.4% of trees affected in a 75-ha plantation in Bliss Twp, Chapleau District.
Phratora purpurea purpurea Brown Aspen skeletonizer	tA	skeletonizing common at low levels through the Timmins and Kirkland Lake districts
Phyllonorycter kenora (Free.) Willow leafblotch miner	W	severe defoliation experienced in the Hearst and Kapuskasing districts
Phyllonorycter nipigon (Free.) Balsam poplar leafblotch miner	bPo	heavy mining recorded in St. John Twp, Cochrane District; low numbers observed in Fushimi Twp, Hearst District
Pikonema dimmockii (Cress.) Greenheaded spruce sawfly	wS	light defoliation recorded at several points in Carty Twp, Chapleau District, Seaton and O'Brien twps, Kapuskasing District, and in Mowbray Twp, Cochrane District
Profenusa thomsoni (Konow) Ambermarked birch leafminer	wB	low populations recorded through the Kirkland Lake and Timmins districts

(cont'd)

Table 6. Other forest insects (concl.).

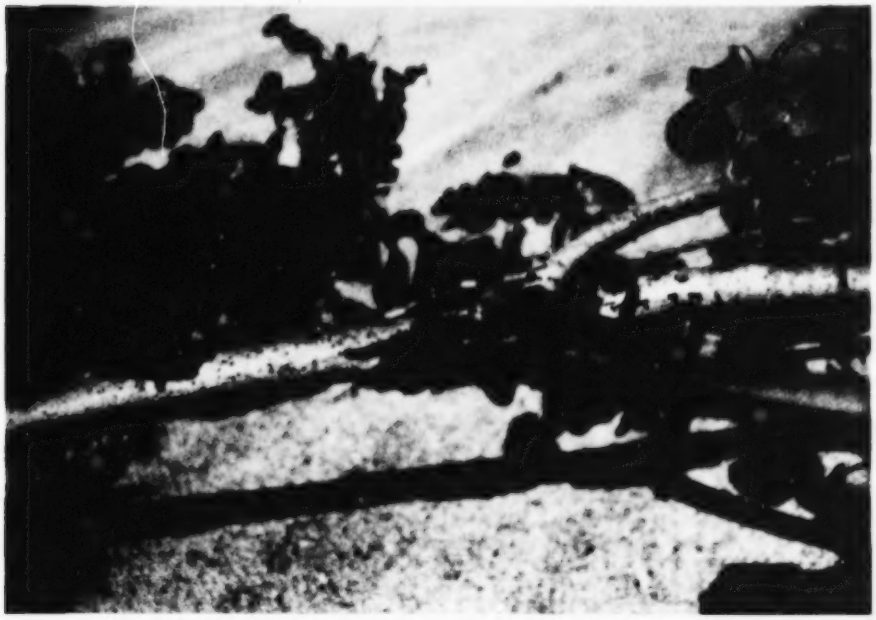
Insect	Host(s)	Remarks
Pseudexentera oregonana Wlshm. Aspen leafroller	tA	lightly defoliated trees at several locations in the Swastika, Dane, Dobie, and Larder Lake areas of the Kirkland Lake District
Psilocorsis reflexella Clem. (= *fletcherella* Gibs.) Flat leaftier	tA	low occurrence through the Five Mile Lake and Ivanhoe prov. parks areas, Chapleau District
Pulicalvaria piceaella (Kft.) Orange spruce needleminer	wS	newly planted trees in the city of Timmins heavily infested
Pyrrhalta decora decora (Say) Gray willow leaf beetle	W	Severe defoliation occurred over approximately 100 ha in the Shillington area, Kirkland Lake and Timmins districts; along hwys 101 and 144, Chapleau and Gogama districts; throughout the Region in smaller infestations.
Rheumaptera hastata (L.) Spearmarked black moth	wB	Occurrence again decreased, with only trace numbers appearing in the Shoals Prov. Park area, Chapleau District
Tetralopha aplastella (Hlst.) Aspen webworm	tA	many nests located throughout the Region; some in association with the forest tent caterpillar
Zeiraphera destitutana (Wlk.) Purplestriped shootworm	wS	light defoliation present in Colquhoun and Sheldon twps, Cochrane District
Zelleria haimbachi Busck Pine needle sheathminer	jP	increased numbers for the second year through the Kirkland Lake and Timmins districts; high numbers observed in the Gogama District; low numbers recorded in Fauquier Twp, Kapuskasing District, Arnott and Hawkins twps, Hearst District

Traps baited with pheromone lures were set in recently burned areas to capture moths of the black army cutworm, *Actebia fennica* (Tausch.)



Black army cutworm larvae (arrows) partially bury themselves into the burnt duff in an attempt to escape the seasonally cool spring winds.

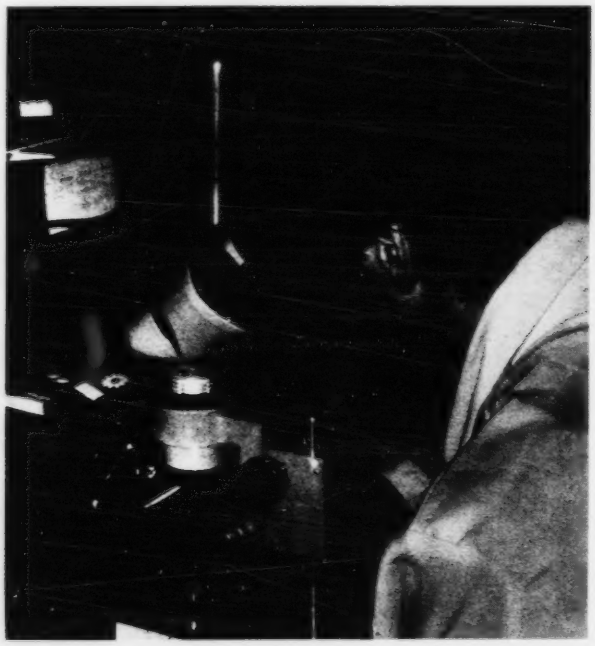
Aerial view of severe defoliation (light areas) caused by the forest tent caterpillar, *Malacosoma disstria* Hbn., in the Gogama District.



Forest tent caterpillar numbers increased throughout the Region.

Scleroderris canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard, caused branch mortality (above) and stem canker (below) in young jack pine (*Pinus banksiana* Lamb.)

Pinewood nematode, *Bursalphelenchus xylophilus* (Steiner & Buhrer) Nickle, samples were chipped from suspect trees and soaked in water (above). Samples were then siphoned and checked for nematode presence (below). Positive identification of samples is made by specialists from the Biosystematics Research Institute in Ottawa.



TREE DISEASES

Major Diseases

Armillaria Root Rot, *Armillaria mellea* (Vahl: Fr.) Kummer

Evaluations were conducted in 23 areas of spruce and jack pine regeneration. The disease was detected on the survey plots at 13 locations (Table 7). These surveys show an increase in tree mortality over the previous year although this was reflected in only one of the five areas that were visited in both years. Over all, an average of 1.1% of the trees in the 13 areas were affected this year, in comparison with 0.4% at six locations in 1984.

"Trees affected" refers to current infections typified by chlorotic-looking trees or trees with foliage attached that have died within the past year. Field identification consists of examination for: the fruiting stage of the fungus, the honey mushroom; the presence of a white mycelial fan between the wood and the bark; the presence of dark brown strands of rhizomorphs between the bark and wood or on the roots, or a pitch extrusion at the root collar.

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Intensive surveys for this serious disease were performed throughout the Region during 1985. At 33 locations examined, only three positive samples of the North American race of Scleroderris were found.

Spring sampling confirmed that a 20-ha plantation in Nimitz Twp, Chapleau District, contained a high number of infected trees. Approximately 15,000 red pine (*Pinus resinosa* Ait.) trees 0.5 m high had 6.5% mortality and another 19.0% were infected with shoot and/or leader mortality. Control was implemented by OMNR personnel. This involved the removal and burning of all infected stock (see photo page). In Lloyd Twp, also in Chapleau District, an estimated 60% of the 2-3 m red pine in a 1-ha area contained lower branch infections. Young roadside jack pine regeneration at the intersection of hwys 144 and 560 in Vrooman Twp, Gogama District, showed a trace of the disease.

Negative results were recorded from the 30 other locations suveyed throughout the Region (Fig. 4).

Table 7. Summary of mortality caused by Armillaria root rot in six districts in the Northern Region in 1985 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Host	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Current mortality (%) 1984	1985
Chapleau District						
Bliss[a]	jP	2.8	2,424	75	0.3	0.3
Cosens	jP	2.9	3,000	25		0.7
Oates	jP	2.0	1,000	10		1.3
Peters	jP	2.7	2,500	40		0.7
Cochrane District						
Sheldon	jP	1.5	2,700	93		0.3
Gogama District						
Bordeleau	jP	1.8	1,000	80		1.6
Vrooman	jP	1.5	4,444	15		1.3
Hearst District						
Cross[a]	jP	2.0	2,541	220	0.3	1.0
Shannon	wS	0.9	1,970	37		0.7
Kirkland Lake District						
Corkill[a]	jP	3.8	2,900	322	0.3	0.3
Doon	jP	0.5	2,990	100		2.0
Skead	jP		2,990	75		3.3
Timmins District						
Robb[a]	jP	2.1	2,900	50	0.3	0.3

[a]300-tree sample

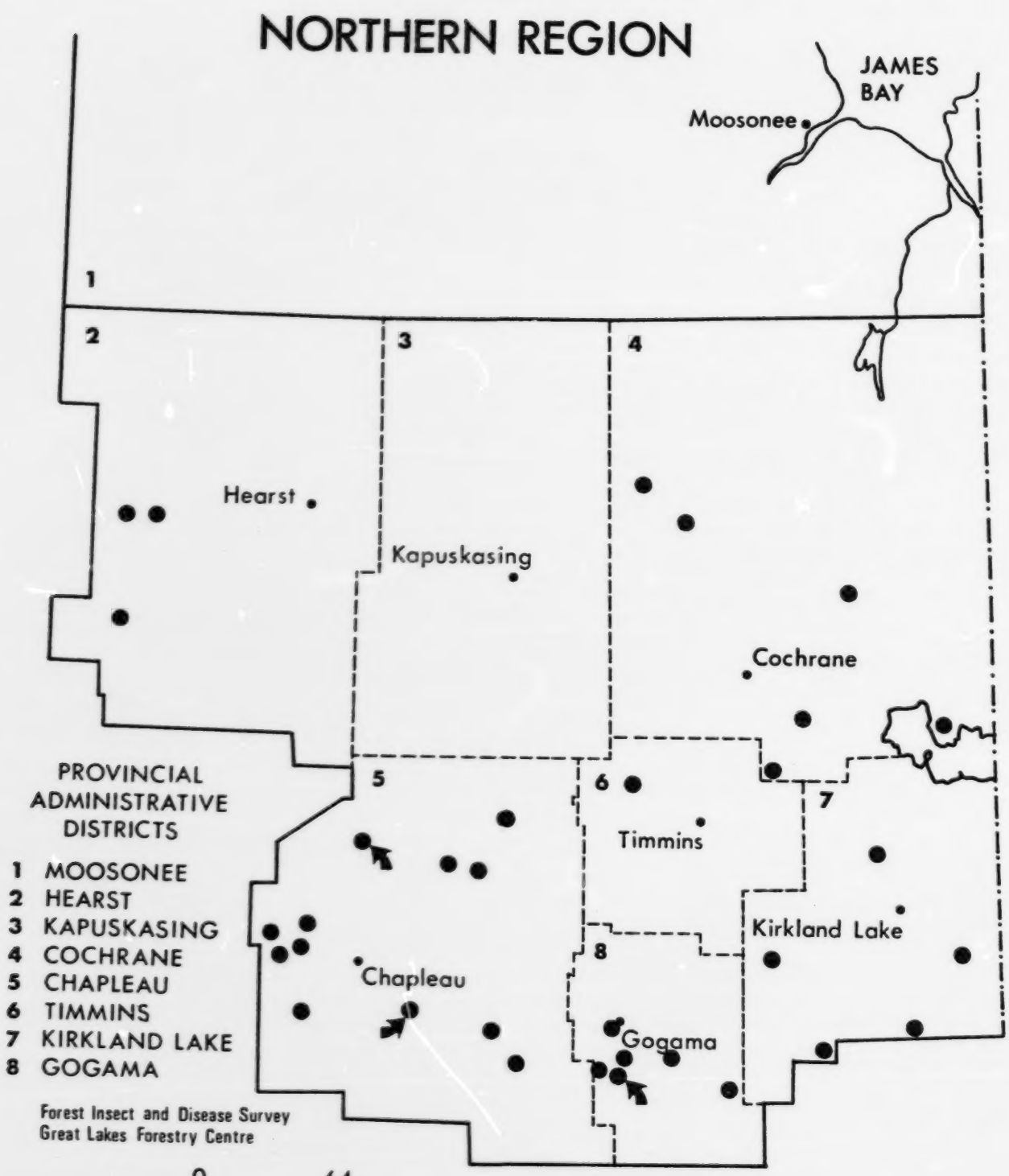


Figure 4. Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Areas surveyed in 1985

Negative for Scleroderris . . .

Positive for Scleroderris . . .

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. and Schwein.) de Bary var. *ledi* and *C. ledicola* (Peck) Lagerb.

Light foliar infections were noted in most stands across the Region. The previous year many of these same stands experienced heavy damage. As stressed in the 1984 report, the degree of damage appears to be a function of weather, and if the correct conditions are not present, a problem will not materialize.

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver

Aerial and ground surveys disclosed a decrease in the incidence of foliar infections in all districts in the Region. Damage was light or absent in most areas, with occasional pockets of less than 10 ha of moderate and severe damage. Up to 100% of the trees examined were affected, with accompanying foliar damage ranging from 1% to 70%.

Light infections were noted in the townships of Orkney and Caithness, Hearst District and Williamson, Seaton and Casselman, Kapuskasing District.

Pockets of moderate and severe damage were recorded in the townships of Studholme, Hearst District; Clergue, Haggart, Walker and Calvert, Cochrane District; Carter and Cabot, Gogama District; Mageau, Chapleau District; Lawson, Henwood, Barber, Grenfell, Benoit and Milner, Kirkland Lake District; and Hassard, Matheson and English, Timmins District.

Pine Needle Rust, *Coleosporium asterum* (Dietel) Sydow

Decreased foliar damage was observed in 1985. Damage was light or nonexistent in most areas of regeneration in the Region.

Although 13 areas were examined to determine its presence and impact, the disease was detected at only five locations (Table 8). Significant damage was apparent in only one area in Arnott Township, Hearst District, where the disease has been a problem for a number of years. There the rust affected 18% of the older foliage on 100% of the 2.0-m trees examined. In 1984 in this same plantation, 43% of the foliage was affected.

Table 8. Summary of damage caused by pine needle rust in three districts in the Northern Region in 1985 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Host	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Trees affected (%)	Defoliation level (%)
Chapleau District						
Bliss[a]	JP	2.8	2,775	75	2.4	1
Gilliland[a]	JP	3.0	2,424	60	1.0	1
Cochrane District						
Sheldon[a]	JP	1.5	2,700	93	6.0	1
Hearst District						
Arnott	JP	2.3	3,000	50	100	18
Cross[a]	JP	2.0	2,541	220	56	1

[a]300-tree sample

Stem Rusts, *Cronartium* spp.

Twenty areas were evaluated for the presence of stem and branch rusts belonging to the genus *Cronartium*. The rusts were detected at nine locations (Table 9). The associated cankers or galls were observed on main stems in eight areas. One branch infection identified as *Cronartium comandra* Peck, was collected north of Lake Abitibi, Cochrane District. The area of highest stem infection occurred in a plantation in Wicksteed Township, Hearst District, where 8% of the trees examined were affected.

Identification of a particular species of a stem rust depends on spore morphology and/or the presence of an alternate host. If fruiting is not present at the time of the survey, a positive identification cannot be made. On the basis of past surveys in the Region, the stem cankers encountered in the present assessments were probably *Cronartium comptoniae* Arthur.

Table 9. Summary of damage caused by *Cronartium* spp. in six districts in the Northern Region in 1985 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Host	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Trees affected (%) branch	stem
Chapleau District						
Bliss[a]	jP	2.8	2,775	75	0	0.3
Cochrane District						
Avon	jP	8.0	3,300	2.0	0	6.0
North of Lake Abitibi	jP	3.0	2,000	25	0.7	0
Gogama District						
Carew	jP	2.6	1,000	206	0	2.0
Vrooman	jP	1.5	4,444	15	0	0.7
Hearst District						
Arnott	jP	2.3	3,000	50	0	1.3
Wicksteed	jP	8.3	3,300	0.5	0	8.0
Kirkland Lake District						
Cane	jP	12.2	2,990	50	0	1.3
Timmins District						
Robb[a]	jP	2.1	2,900	50	0	2.1

[a]300-tree sample

Table 10. Other forest diseases.

Organism	Host(s)	Remarks
Apiosporina collinsii (Schwein.) Höhnel Black leaf curl	Service-berry	Light infections occurred over a 10-ha area in Bordeleau Twp, Chapleau District.
Blumeriella jaapii (Rehm) v. Arx Shot-hole	ch	In Bordeleau Twp, Chapleau District, a 1-ha area was severely infected.
Ceratocystis ulmi (Buism.) C. Moreau Dutch elm disease	E	Surveys through the Cochrane, Timmins, Chapleau and Gogama districts did not reveal the disease.
Cladosporium sp. Leaf spot	Lilac	host subjected to 100% premature defoliation through the town of Chapleau
Davisomycella ampla (J. Davis) Darker Tar spot needle cast	jP	Light infections occurred at several points throughout the Region.
Endocronartium harknessii (J.P. Moore) Y. Hirats. Western gall rust	jP	Low numbers of galls were observed throughout the Region. In Cosens Twp, Chapleau District, a 25-ha plantation had 0.6% tree mortality.
Linospora tetraspora G.E. Thompson Leaf blight	bPo	Severe infections caused premature defoliation in numerous host stands throughout the Kapuskasing, Hearst and western Cochrane districts.
Melampsora epitea Thüm. Larch-poplar rust	W	Symptomatic bright orange spores of this rust could be seen at light levels in the Shoals Prov. Park area, Chapleau District.
Mycosphaerella populorum G.E. Thompson Leaf spot		commonly found throughout the Chapleau and Gogama districts at varying levels; 100% of foliage infected over a 20-ha area in the Shoals Prov. Park, Chapleau District

(cont'd)

Table 10. Other forest diseases (concl.).

Organism	Host(s)	Remarks
Rhytisma salicinum (Pers.: Fr.) Fr. Tar spot	W	light infection levels found throughout the Chapleau and Gogama districts
Venturia macularis (Fr.) E. Müller and v. Arx	tA	severe terminal infections in most areas of regeneration throughout the Region

ABIOTIC DAMAGE

Moisture/Cold

Approximately 470,000 3-year-old jack pine seedlings were killed as a result of the weather in Garibaldi Township, Gogama District. A similar problem occurred in four compartments at the Chapleau Forest Nursery, Chapleau District. In both instances the foliage became progressively discolored from the tips of the trees to the root collars. Roots appeared to be water-soaked and relatively small. Causal agents were presumed to be transpiration problems as a result of cold and/or abnormally wet soil. Lab cultures of the seedlings revealed negative pathogens present in the infected stock.

SPECIAL SURVEYS

Jack Pine Plantations

A special survey was conducted to assess the impact of insect and disease related problems in 18 jack pine plantations (Fig. 5) in the northern Region (Table 11). Stand selection was from three height classes: 2 m, 2-6 m and 6 m. Six of the areas examined in the current survey were the 300-tree semipermanent plots established in 1982 (Table 11). Each of the other 12 stands of jack pine consisted of a 150-tree sample. Two visits were made to each plot during the periods 3-21 June and 29 July to 30 August. The stands were evaluated to detect the presence of the following selected insects and diseases.

Insects: jack pine budworm, jack pine sawflies, white pine weevil, eastern pine shoot borer, jack pine tip beetle and Swaine jack pine sawfly

Diseases: Armillaria root rot, pine needle rust, Scleroderris canker, western gall rust, stem rust and tar spot needle cast

Insects and disease not found in the current survey:

Insect(s): Swaine jack pine sawfly

Disease(s): Scleroderris canker

Miscellaneous insects and diseases or abiotic damage not specifically designated as part of the survey were also assessed when found, but none was responsible for appreciable damage. They include:

Table 11. Summary of the results of a special survey of 18 jack pine plantations in the Northern Region in 1985 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Estimated stand area (ha)	Estimated no. of trees per ha	Height class (m)	Jack pine budworm		White pine weevil	Eastern pine shoot borer		Jack pine tip beetle	Jack pine sawflies	
				Trees affected (%)	Defoliation (%)	Trees affected (%)	Leaders attacked (%)	Laterals attacked (%)	Leaders attacked (%)	Trees affected (%)	Defoliation (%)
Chapleau District											
Bliss[a]		2,775	2.1-6.0	1.0	1	2.4	3.8	4.5	4.5	0	0
Bordeleau	80	1,000	0.5-2.0	2.7	1	6.7	6.0	1.3	3.3	0	0
Dalmas	132	1,000	6.0	0	0	0	0	0	0	0	0
Gilliland[a]	60	2,424	2.1-6.0	0	0	5.8	8.5	7.2	6.6	0	0
Cochrane District											
Avon	2.0	3,300	6.0	0	0	0	0	0	0	0.3	1
North of Lake Abitibi	25	2,000	2.1-6.0	1.3	1	0	0.7	2.0	0	0	0
Sheldon[a]	93	2,700	0.5-2.0	0	0	0	0	0	0	0	0
Gogama District											
Burrows	50	3,300	2.1-6.0	90	10	0	0	0	0	0	0
Garibaldi	26	2,300	0.5-2.0	95	4	0.7	1.3	1.3	1.3	0	0
Hearst District											
Arnott	50	3,000	2.1-6.0	0	1.3	1.3	0.7	0	18	18	0
Cross	220	2,550	0.5-2.0	9.6	1	0	0	0	0	0	0
Wicksteed	0.5	3,300	6.0	30	1	0	0	0	0	0	0
Kirkland Lake District											
Benoit	100	2,400	6.0	0	0	0.7	0	0	0.7	0	0
Cane	50	2,900	6.0	10.7	15	0	0	0	0	0	0
Corkill[a]	322	2,900	2.1-6.0	100	5	14.1	1.7	1.7	0.3	0	0
Doon	100	2,990	0.5-2.0	6.7	1	2.0	2.0	0	0	0	0
Skead	75	2,990	0.5-2.0	4.0	1	12.7	9.3	4.0	0	0	0
Timmins District											
Robb[a]	50	2,900	2.1-6.0	0	0	0	2.4	0	0.3	0.3	1

[a]300-tree sample

(cont'd)

Table 11. Summary of the results of a special survey of 18 jack pine plantations in the Northern Region in 1985 (counts based on the examination of 150 or 300 randomly selected trees at each location) (concl.).

Location (Twp)	Estimated stand area (ha)	Estimated no. of trees per ha	Height class (m)	Armillaria root rot	Stem rusts		Western gall rust		Pine needle rust	Tar spot needle cast
				Trees affected (%)	Trees affected (%)	Trees severely[a] affected (%)	Trees affected (%)	Trees severely[a] affected (%)	Avg foliar damage (%)	Avg foliar damage (%)
Chapleau District										
Bliss[a]	75	2,775	2.1-6.0	0.3	0.3	0.3	0	0	1	1
Bordeleau	80	1,000	0.5-2.0	2.0	0	0	0	0	0	0
Delmas	132	1,000	6.0	0	0	0	4.7	0	0	0
Gilliland[a]	60	2,424	2.1-6.0	0	0	0	1.0	1.0	1	1
Cochrane District										
Avon	2.0	3,300	76.0	0	6.0	6.0	0	0	0	1
N. of Lake Abitibi	25	2,000	2.1-6.0	0	0.7	0	0	0	0	0
Sheldon[a]	93	2,700	0.5-2.0	0.3	0	0	0	0	1	0
Gogama District										
Burrows	50	3,000	6.0	0	0	0	0.7	0	0	0
Garibaldi	26	2,300	0.5-2.0	0	0	0	0	0	0	0
Hearst District										
Arnott	50	3,000	2.1-6.0	0	1.3	1.3	0.7	0	18	0
Cross[a]	220	2,550	0.5-2.0	1.0	0	0	0.3	0	1	0
Wickstead	0.5	3,300	6.0	0	8.0	8.0	0	0	0	0
Kirkland Lake District										
Benoit	100	2,400	6.0	0	0	0	0	0	0	1
Cane	50	2,990	6.0	0	1.3	1.3	0	0	0	1
Corkill[a]	322	2,900	2.0-6.0	0.3	0	0	0	0	0	0
Doon	100	2,900	0.5-2.0	2.0	0	0	0	0	0	0
Skead	75	2,900	0.5-2.0	3.3	0	0	0	0	0	0
Timmins District										
Robb	50	2,900	2.1-6.0	0.3	2.1	2.1	0	0	0	0

[a]300-tree sample.

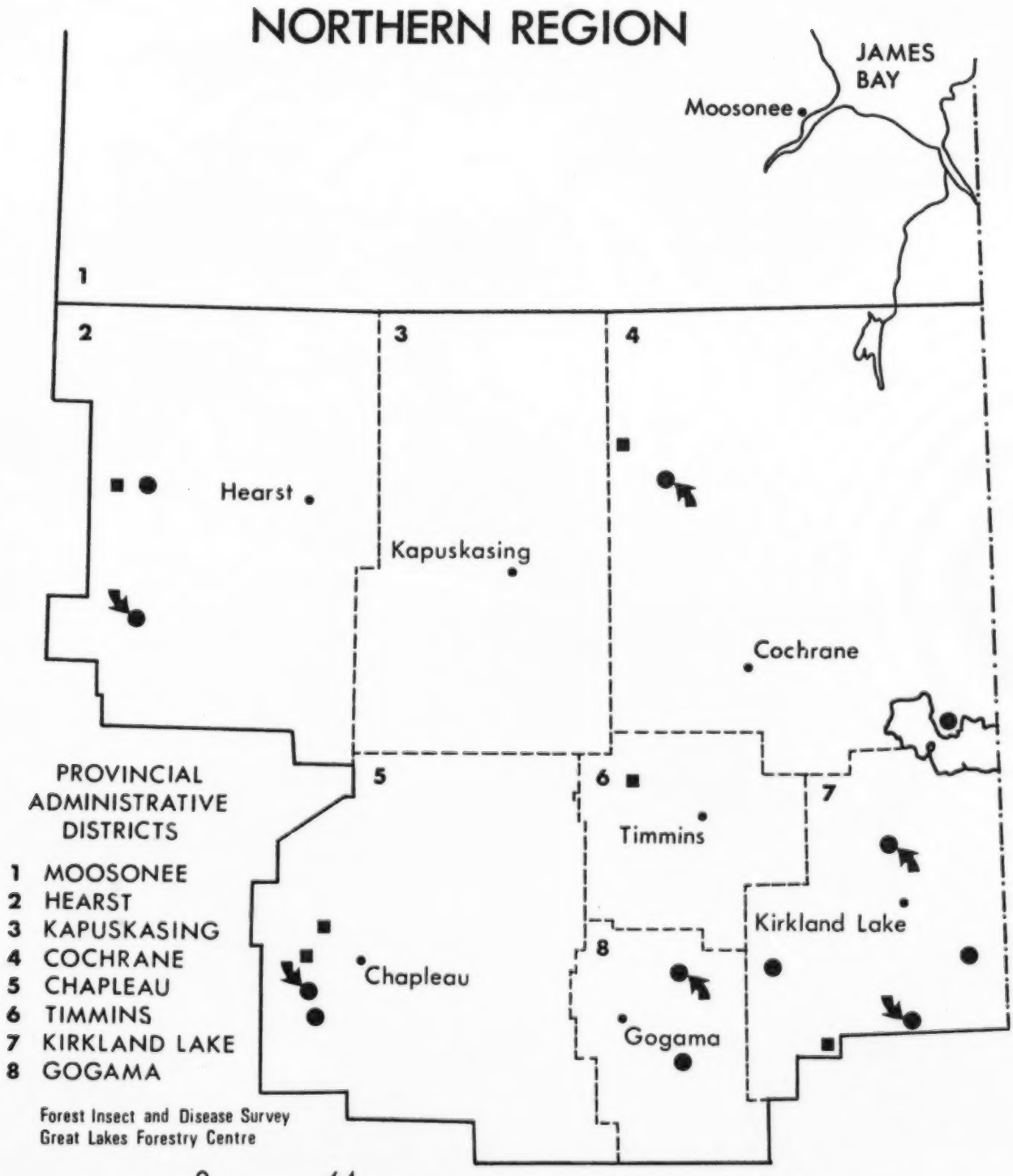


Figure 5. Jack pine (*Pinus banksiana* Lamb.) plantations surveyed in 1985

Special survey plots . . . . . ●

Special survey root rot plots . . ●

Permanent plots 1982-1985 . . . . ■

Insects: jack pine aphid, jack pine resin midge, jackpine tube moth, northern pitch twig moth, pine-and-clover tier, pine needle sheathminer, pine tortoise scale, *Toumeyella parvicornis* (Ckll.), whitetriangle moths

Diseases: No miscellaneous diseases were encountered.

Jack pine budworm, eastern pine shoot borer and white pine weevil were the main insects causing significant damage in the current survey. Armillaria root rot and stem rusts were the two disease organisms causing tree mortality or main stem damage.

A comparison with a similar survey conducted in 1982 revealed that populations of the jack pine budworm increased in 1985. In the previous survey this pest was not detected. Current evaluation showed that an average of 21% of the trees were attacked, and defoliation averaged approximately 1% (Table 11).

Higher numbers of white pine weevil were noted in the current survey. Leader damage averaged 2.5% in 1985 and only 1.4% in 1982.

Populations of eastern pine shoot borer increased in 1985. In the previous survey an average of 1.2% and 0.8% of the leaders and laterals were infested, respectively. Results of the current survey revealed average leader damage of 1.9% and average lateral damage of 1.2%.

Average leader damage caused by the jack pine tip beetle increased from 0.2% in the initial survey to 0.9% in the latest survey.

Decreased numbers of jack pine sawflies were observed in the current survey. In 1982 the pest was found in four areas and defoliation averaged 0.7%. Colonies were collected in only one area in 1985 with negligible defoliation.

No evidence of Swaine jack pine sawfly was found in either survey.

The incidence of Armillaria root rot increased in the current survey; an average infection of 0.5% was recorded, in comparison with 0.1% in 1982.

Main stem infections caused by *Cronartium* sp. in the current survey averaged 1.1% and were comparable with those in the 1982 survey, in which 1.3% of the stems were infected.

A slight increase in the incidence of pine needle rust was noted in the current survey. Foliar damage averaged 1% in 1985 and less than 1% in 1982.

Infections of tar spot needle cast were light in both surveys.

Jack Pine Seed and Cone Pests

Two areas were sampled to assess the types of insects and diseases and their impact on the cone and seed crops. One hundred 2-year-old cones from a minimum of three trees representing the total length of the cone-bearing crown were collected in the first week of July. Cones were taken from an SPA in Garibaldi Township, Gogama District, and from the Bonner Tree Improvement Centre (BTIC), Fauquier Township, Kapuskasing District.

Dissection of cones from the Garibaldi SPA revealed that 95% of the cones were damaged, with a resultant seed loss in the damaged cones of 100%. The cones from this location were small, and many lacked developed seeds. This condition was not considered to be related to insects or diseases. Some cones did have damage attributable to a Lepidoptera species, probably jack pine budworm. The SPA was within the area of moderate-to-severe defoliation caused by this pest. No diseased cones were found.

Ninety-nine percent of the cones collected in the BTIC were damaged, and there was an accompanying seed loss of 48%. The agents responsible for this damage, in order of importance, were: webbing coneworm, *Dioryctria disclusa* Heinr.; fir coneworm, and a Lepidoptera insect. Low numbers of jack pine budworm were collected and would probably account for the damage by Lepidoptera insects. No diseased cones were found at this location.

Jack Pine Root Rot Survey

A survey to determine the presence and extent of internal decay in jack pine plantations was conducted in the six special survey areas in the 6.0 m classification. Evaluation consisted of extracting a core that extended completely through the tree 15 cm above ground level from 20 trees at each location. Stain or decay at this height is a reliable indicator of root rot. Each tree section was examined for stain or decay. The following measurements were acquired for each tree section: DBH, length of sound, stained or decayed wood.

No stained or decayed wood was recovered in Flavelle or Benoit townships, Kirkland Lake District. Thirty-five percent of the 20 trees in Dalmas Township, Chapleau District, had stain present in core sam-

ples. Stain was found in 25% of the trees examined in Burrows Township, Gogama District. Ten percent of the trees in a plantation in Wicksteed Township, Hearst District, showed evidence of stain. Decay associated with this stain was present in one tree with a basal stem canker. The canker was the responsible agent, not root rot fungus. Stain was present in 10% of the trees surveyed in Avon Township, Cochrane District, with 5% of the trees having decayed wood.

None of the affected cores was submitted for analysis or culturing, so causal fungi were not identified.

Permanent Jack Pine Sample Plots

The six 300-tree jack pine plots established in 1982 in jack pine regeneration under 2 m in height were examined for the final time in 1985. Over a 4-year period they have provided a record of typical insect and disease related pests affecting jack pine plantations in the Region (Table 12). A yearly measurement of terminal growth was also recorded. White pine weevil and eastern pine shoot borer were the two most repetitive insect problems, both affecting tree form. Armillaria root rot and stem rusts were the most destructive disease organisms. One percent of the original 1,800 trees were killed in the 4-year assessment. The best growing season occurred in 1985 when the average terminal growth for trees in the six areas examined was .54 m.

Gypsy Moth Pheromone Traps

Pheromone traps were set out in 12 provincial parks and one private park in the Region to detect the presence of gypsy moth, *Lymantria dispar* (L.). The traps, baited with a synthetic lure, were deployed in campgrounds because the eggs can be transported by recreational vehicles travelling from infested areas. Except for Nagagamisis Provincial Park, Hearst District, two traps were set out at each location. Nagagamisis Provincial Park was the site of a positive catch in 1984, so in order to determine if a population might exist, 10 traps were deployed. No adults were trapped in 1985.

Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle

An extensive survey was conducted in the Region to detect the presence of this pest (Fig. 6). The nematodes are believed to be transferred from an affected tree to a healthy one by sawyer beetle, *Monochamus* spp., feeding activity or oviposition. The nematodes rapidly multiply in the sapwood of affected trees, disrupting water flow within the trees. Nematode-infested trees have been found in Sudbury and North Bay districts and at several locations in southern Ontario.

Table 12. A comparative summary of the results of the survey of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location).[a]

Location (Twp)	Estimated stand area (ha)	Estimated no. of trees per ha	Year of evaluation	Avg growth of trees (m)	Jack pine budworm		White pine weevil	Eastern pine shoot borer		Jack pine tip beetle	Jack pine sawflies	
					Trees affected (%)	Defoliation (%)	Leaders attacked (%)	Leaders attacked (%)	Laterals attacked (%)	Leaders attacked (%)	Trees affected (%)	Defoliation (%)
Chapleau District												
Bliss	75	2,775	1982	NA	0	0	0.3	0	0.3	0.3	0	0
			1983	.47	0	0	0.3	1.0	0	0	0	0
			1984	.50	0	0	1.0	1.7	0	0.3	0	0
			1985	.90	1.0	1	2.7	3.8	4.5	4.5	0	0
Gilliland	60	2,424	1982	NA	0	0	0.7	0.3	0	0	0	0
			1983	.53	0	0	1.0	5.3	1.3	0	0	0
			1984	.58	0	0	2.7	8.2	4.1	0.3	0	0
			1985	.49	0	0	5.8	8.5	7.2	6.6	0	0
Cochrane District												
Sheldon	93	2,700	1982	NA	0	0	0	0	0	0	0	0
			1983	.28	0	0	0	0	0	0	0	0
			1984	.37	0	0	0.3	1.0	0	0	0	0
			1985	.39	0	0	0	0	0.3	0	0	0
Hearst District												
Cross	220	2,541	1982	NA	0	0	0	0	0	0	0	0
			1983	.36	1.3	1	0	0.7	1.0	0	0	0
			1984	.41	0	0	0	0	0	0	0	0
			1985	.52	9.6	1	0	0	0	0	0	0
Kirkland Lake District												
Corkill	322	2,900	1982	NA	0	0	1.0	1.6	0	0	0	0
			1983	.54	0	0	3.3	4.3	0	0	0	0
			1984	.62	0	0	7.5	4.4	0	1.0	0	0
			1985	.54	100	5	14.1	1.7	1.7	0.3	0	0
Timmins District												
Robb	50	2,900	1982	NA	0	0	0	1.3	0	0	0.3	10
			1983	.30	0	0	0	1.0	0	0	0.3	1
			1984	.39	0.3	1	0.3	1.0	0	0	0	0
			1985	.41	0	0	0	2.4	0	0.3	0.3	1

[a]Plots now have 300 trees because of mortality.

(cont'd)

Table 12. A comparative summary of the results of the survey of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location).[a] (concl.)

Location (Twp)	Estimated stand area (ha)	Estimated no. of trees per ha	Year of evaluation	Avg growth of trees (m)	Armillaria root rot	Stem rust	Western gall rust	Pine needle rust	Tar spot needle cast
					Trees affected (%)	Trees affected (%)	Trees affected (%)	Avg foliar damage (%)	Avg foliar damage (%)
Chapleau District									
Bliss	75	2,775	1982		0	0	0	1	0
			1983		0.3	1.7	0.3	0	0
			1984		0.3	0.7	0	0	0
			1985		0.3	0.3	0	1	1
Gilliland	60	2,424	1982		0.3	0	1.0	0	0
			1983		0.7	0	2.3	0	0
			1984		0.3	0	1.7	0	0
			1985		0	0	1.0	1	1
Cochrane District									
Sheldon	93	2,700	1982		0	0	0	0	0
			1983		0	0	0	0	0
			1984		0	0	0	0	0
			185		0.3	0	0	1	0
Hearst District									
Cross	220	2,541	1982		0	0	0	1	0
			1983		0.3	0	0	1	0
			1984		0.3	0	0.3	1	0
			1985		1.0	0	0.3	1	0
Kirkland Lake District									
Corkill	322	2,900	1982		0.3	0	0	0	0
			1983		0	0	0	0	0
			1984		0.3	0	0	0	0
			1985		0.3	0	0	0	0
Timmins District									
Robb	50	2,900	1982		0	0	0	0	0
			1983		0	0	0	0	0
			1984		0.3	32.1	0	0	0
			1985		0.3	2.1	0	0	0

[a]Plots now have 300 trees because of mortality.

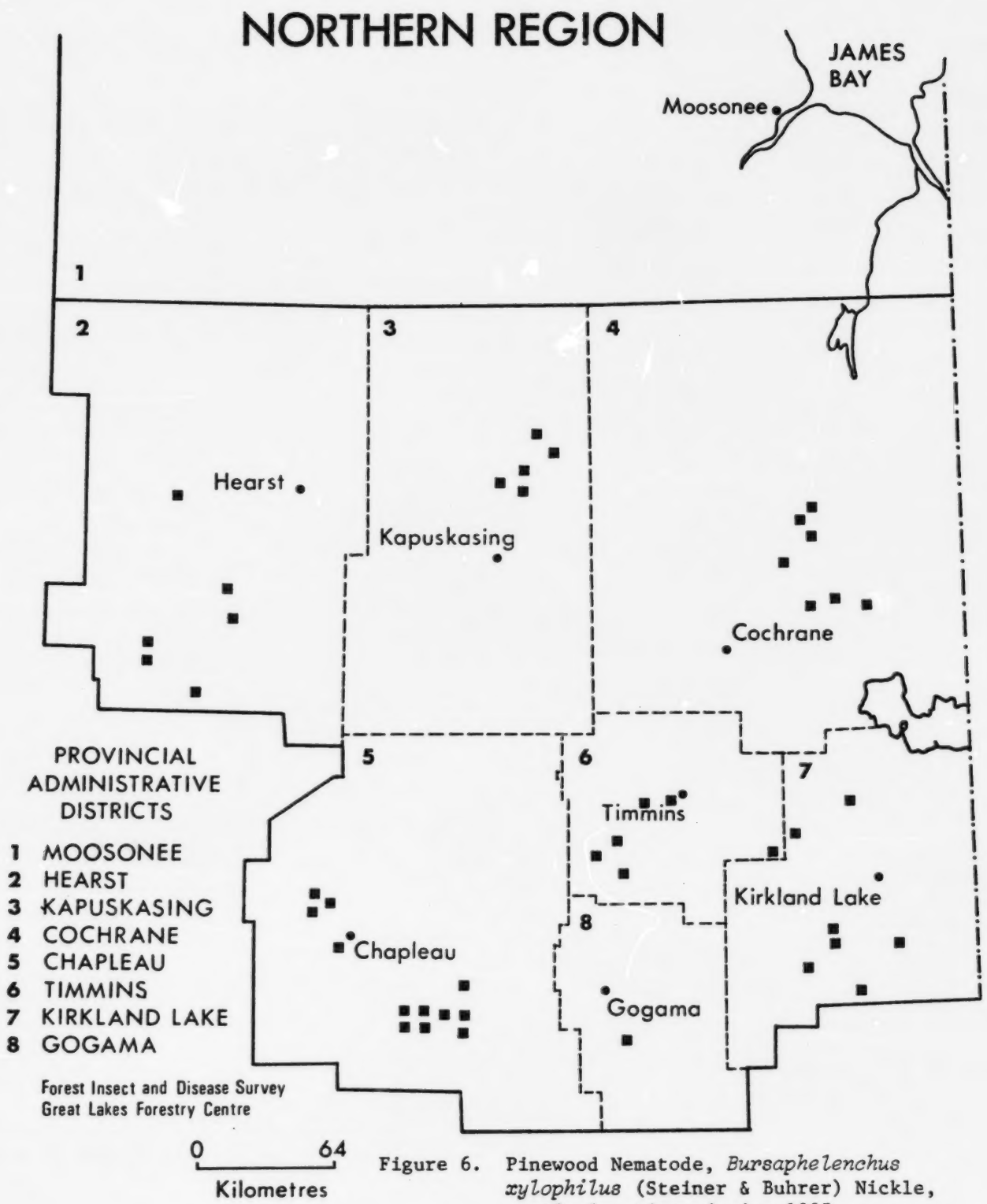


Figure 6. Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle, sample locations during 1985 . . . . . ■

Fifty-six trees were cut down in the Northern Region. Balsam fir (*Abies balsamea* [L.] Mill.), jack pine and black spruce trees exhibiting typical symptoms (dying, chlorotic or recently dead trees with needles attached) of pinewood nematode attack were sampled. Three discs were removed from different parts of the tree and shipped to the Great Lakes Forestry Centre for analysis (see photo page). Twenty-four of the submitted samples were negative. Preliminary examination has revealed a type of nematode in the remaining 32 samples. These samples are being further analyzed to determine if any contain the pinewood nematode.

Acid Rain National Early Warning System (ARNEWS)

A study plot was established in a jack pine plantation in Cane Township, Kirkland Lake District. This brings the number of study plots to three in the Region. A plot was established in 1984 in a natural stand of black spruce in Hopkins Township, Kapuskasing District, and another in a natural jack pine stand in Deans Township, Chapleau District.

Measurements and samples were taken from each plot. Increment cores and one- and two-year-old foliage samples were taken from off-plot trees. Branches were removed from these trees and shoot length, bud development, needle retention and other variables were measured. Each tree on the plot was examined for insect- and disease-related damage. Ground cover was also examined and the plant species growing on the plot were collected and described, since certain plants are known to be sensitive indicators of acid rain.

Climatic Data

Weather records for three stations, the Kapuskasing, Earlton and Chapleau airports, have been included in this report (Tables 13, 14 and 15). Weather plays an important part in insect development and the spread of infectious diseases, and is the cause of many noninfectious conditions such as frost and hail damage, winter drying and drought. It also affects the success of spray operations for insect control.

Table 13. A comparison of mean temperature and total precipitation, and their normal values (based on a 30-year period), at the Kapuskasing Airport in 1985.

Month	Mean temp. 1985 (°C)	Normal temp. (°C)	Deviation from normal temp. (°C)	Total precip. 1985 (mm)	Normal precip. (mm)	Deviation from normal precip. (mm)
Jan.	-18.5	-18.6	+0.1	34.6	53.6	-19.0
Feb.	-16.9	-16.2	-0.7	70.7	43.0	+27.7
Mar.	- 8.1	- 9.4	+1.3	39.6	55.4	-15.8
Apr.	1.0	0.5	+0.5	58.0	53.2	+ 4.8
May	8.8	8.3	+0.5	69.3	74.3	- 5.0
June	12.7	14.1	-1.4	51.1	84.7	-33.6
July	15.5	16.8	-1.3	157.4	96.3	+61.1
Aug.	15.7	15.3	+0.4	59.6	92.5	-32.9
Sept.	11.2	10.0	+1.2	87.4	94.4	- 7.0
Oct.	5.5	4.4	+1.1	60.2	77.4	-17.2
Nov.	- 7.8	- 4.4	+12.2	110.0	80.1	+29.9
Dec.	-18.1	-14.7	- 3.4	54.0	53.3	+ 0.7

Table 14. A comparison of mean temperature and total precipitation, and their normal values (based on a 30-year period), at the Earlton Airport in 1985.

Month	Mean temp. 1985 (°C)	Normal temp. (°C)	Deviation from normal temp. (°C)	Total precip. 1985 (mm)	Normal precip. (mm)	Deviation from normal precip. (mm)
Jan.	-18.3	-16.3	-2.0	32.2	56.4	-24.2
Feb.	-12.8	-14.1	+1.3	62.4	47.2	+15.2
Mar.	- 6.5	- 7.6	+1.1	53.0	58.0	- 5.0
Apr.	2.8	1.9	+0.9	61.8	50.0	+11.8
May	9.5	9.8	-0.3	56.2	61.3	- 5.1
June	14.0	15.2	-1.2	64.5	89.2	-24.7
July	16.7	17.7	-1.0	168.5	80.8	+87.7
Aug.	16.3	16.2	+0.1	56.5	83.4	-26.9
Sept.	12.2	11.1	+1.1	86.9	99.1	-12.3
Oct.	5.8	5.4	+0.4	47.7	70.0	-22.3
Nov.	- 4.3	2.5	-6.8	72.3	70.6	+ 1.7
Dec.	-16.7	-12.6	-4.1	41.1	56.3	-15.2

Table 15. A comparison of mean temperature and total precipitation, and their normal values (based on a 30-year period), at the Chapleau Airport in 1985.

Month	Mean temp. 1985 (°C)	Normal temp. (°C)	Deviation from normal temp. (°C)	Total precip. 1985 (mm)	Normal precip. (mm)	Deviation from normal precip. (mm)
Jan.	-16.4	-16.9	-0.5	43.6	46.9	- 3.3
Feb.	-14.0	-15.8	+1.8	110.4	34.5	+75.9
Mar.	- 6.4	- 8.6	+2.2	37.6	56.2	-18.6
Apr.	- 0.1	0.6	-0.7	-	59.3	-
May	9.0	8.6	+0.4	80.4	73.8	+ 6.6
June	12.4	14.3	-1.9	55.6	100.4	-44.8
July	15.1	16.8	-1.7	82.2	81.8	+ 0.4
Aug.	15.5	15.4	+0.1	52.6	86.2	-33.6
Sept.	11.6	10.4	+1.2	96.4	101.5	- 5.1
Oct.	5.2	4.9	+0.3	33.8	75.7	-41.9
Nov.	- 5.1	- 3.5	-1.6	68.4	64.2	+ 4.2
Dec.	-16.8	-12.8	-4.0	61.3	53.5	+ 7.8